REMARKS

The abstract has been amended in order to correct a formal defect contained therein. No new matter has been added. The specification has been amended in order to correct a grammatical error contained therein. No new matter has been added.

Claims 1 and 17 have been amended in order to more particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Claims 1 and 17 now recite that a flow consisting essentially of carbon dioxide gas is discharged from the calciner. Support for this amendment can be found in the last paragraph on page 9 and the first paragraph on page 10 of the present specification. No new matter has been added.

Claims 1 and 17 have been rejected under 35 USC 103(a) as being unpatentable over Morin in view of EP 118770 (EP '770), WO 94/21965 (WO '965) and Moss. Claims 2-8 and 13-15 have been rejected over Morin, EP '770, Moss and WO '965 and further in view of Crawford. Applicants respectfully traverse these grounds of rejection and urge reconsideration in light of the following comments.

The currently claimed invention is directed to a process for capturing and recovering carbon dioxide and sulphur dioxide from the combustion of a carbonaceous fuel having a high carbon content, a relatively high sulphur content and a low ash content. The present invention is also directed to an apparatus for performing this process. The process steps comprise (a) splitting a flow of carbonaceous fuel having a particle size compatible with combustion in a fluidized bed into a major proportion and a minor proportion, (b) transferring the major portion of the fuel to a pressurized fluidized bed combuster and carbonator, PFBC/C, (c) combusting the major proportion of the fuel flow in the PFBC/C in the presence of air and in the presence of calcium oxide, (d) recovering a flue gas flow containing solids including calcium

carbonate and calcium sulphate from the PFBC/C, (e) separating the solids from the flue gas flow, (f) transferring the minor proportion of the fuel to a calciner, (g) combusting the minor proportion of the flow of fuel in the calciner in the presence of both relatively pure oxygen and a solids flow separated in step (e) to convert the calcium carbonate in the solids flow into calcium oxide and carbon dioxide gas, (h) discharging and recovering a flow consisting essentially of carbon dioxide gas from a calciner, (i) recovering a flow of solids from a calciner including the calcium oxide generated in the calciner, (j) transferring the flow of solids obtained in step (i) to the PFBC/C to provide the calcium oxide required in step (c) and (k) recovering calcium sulphate and spent solids from the solids flowing through the PFBCC/C and adding fresh calcium carbonate to the calciner to maintain a solids balance within the process.

As pointed out in the present specification, the present invention provides both a process and apparatus enabling a fuel having a high carbon content, a relatively high sulfur content and a relatively low ash content to be combusted without the release of potentially damaging amounts of carbon dioxide and sulphur dioxide. The carbon dioxide and sulfur dioxide produced by the combustion of the carbonaceous fuel with both a high carbon content and a relatively high sulphur content can be recovered as a usable product. The gas discharged from the calciner consists essentially of carbon dioxide and can be used in enhanced oil recovery processes and the calcium sulfate can be used in the manufacturing of building products such as gypsum wall board. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

The Morin reference discloses a method of treating solid residue resulting from the combustion of a sulphur-containing fuel and a heat treatment apparatus for implementing the method. This reference discloses a heat treatment unit 14 which receives a combustion residue 12 constituted by lime,

calcium sulphate and a small portion of coal ash discharged from a boiler 5, a fuel 15 such as coal and air 16, optionally enriched with oxygen. The temperature range inside the heat treatment unit is from 1100-1400°C in order that the calcium sulphate decomposes to give lime and sulfur dioxide. The sulfur dioxide gas 18, mixed with flue gases including nitrogen, carbon dioxide and surplus oxygen, is removed and sent to a sulfuric acid production unit. The solid matters resulting from the combustion that takes place in the heat treatment unit contains lime and a small proportion of ash from the fuel.

In the outstanding Office Action, the Examiner states that the heat treatment unit 14 acts as a calciner. However, in the calciner of the present invention, the minor portion of the flow of fuel is combusted in the presence of relatively pure oxygen and a flow consisting essentially of carbon dioxide gas discharged therefrom. In contrast thereto, the heat treatment unit 14 of Morin utilizes air, which can be optionally enriched with oxygen, as a fuel and discharges a gaseous product made up of sulfur dioxide gas, flue gases including nitrogen and carbon dioxide, and surplus oxygen. Therefore, there is no attempt in this reference to produce a stream of carbon dioxide suitable for sequestration that is separate from nitrogen and other contaminant gases, and the flue gas is mixed with sulfur dioxide and passed directly to a sulfuric acid production unit. As such, the method and apparatus of Morin are clearly incapable of producing a stream of carbon dioxide which could be sequestered. The presence of the other gases in the gas discharge and heat treatment unit of Morin makes this impossible. On the other hand, the calciner of the present invention receives an input comprising calcium carbonate and is combusted in the presence of relatively pure oxygen such that a flow consisting essentially of carbon dioxide gas, and not a flow of mixed gases, is discharged which can be captured for sequestration.

Therefore, this reference clearly does not teach the process or apparatus required for the presently claimed invention.

The secondary references cited by the Examiner do not provide the motivation to one of ordinary skill in the art to modify the primary reference in a manner that would yield the presently claimed invention. That is, EP '770, which is cited by the Examiner as disclosing a flow regulator having a split feeder/manifold, does not contain teachings which would motivate one of ordinary skill in the art to operate the apparatus of Morin in a manner which would enable an off-gas consisting essentially of carbon dioxide to be discharged from the calciner.

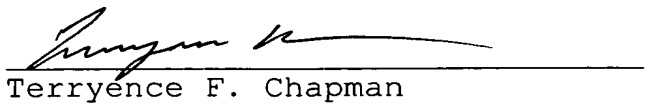
WO '965 discloses that a flue gas is composed of carbon monoxide, carbon dioxide, hydrogen and nitrogen and, in Figure 1, "combustion air" is clearly fed to the flue gases exiting the regenerator 12 which confirms that the process of this reference is clearly incapable of producing a stream consisting essentially of carbon dioxide for sequestration.

The Moss reference has been cited by the Examiner as disclosing fresh calcium carbonate being fed to the reactor. However, this reference is directed to a method relying on the chemical system calcium sulfate/calcium sulfide as an oxygen carrier. This is clearly distinguishable from the present invention and cannot be regarded as teaching or suggesting the calcium carbonate/calcium oxide system of the present invention as a carbon dioxide carrier.

The Crawford reference has been cited by the Examiner as disclosing a fluid petroleum coke's chemical composition. The disclosure in this reference of a composition of an agglomerated petroleum coke does not cure the deficiencies contained in the previously discussed references with respect to the presently claimed invention and, as such, it is respectfully submitted that the presently claimed invention is patentably distinguishable over any combination of the references cited by the Examiner.

The Examiner is respectfully requested to reconsider the present application and to pass it to issue.

Respectfully submitted,



Terryence F. Chapman

TFC/smd

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 Rambling Road
Kalamazoo, MI 49008-1631
Phone: (269) 381-1156
Fax: (269) 381-5465

David G. Boutell Reg. No. 25 072
Terryence F. Chapman Reg. No. 32 549
Mark L. Maki Reg. No. 36 589
Liane L. Churney Reg. No. 40 694
John A. Waters Reg. No. 24 802
Brian R. Tumm Reg. No. 36 328
Donald J. Wallace Reg. No. 43 977
Dale H. Thiel Reg. No. 24 323
Sidney B. Williams, Jr. Reg. No. 24 949
Heon Jekal Reg. No. L0379*
*limited recognition number

Encl: Replacement Abstract
Postal Card

136.07/05